1: Bowen-Jones et al. EZ6 Malta EZ6

● 132

[For additional data on climate, see category 116, pp. 48-81.]

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

[P.83]

Chapter III

EDAPHIC AND ECOLOGICAL

A. Soils of Malta and Gozo (Fig. 27)

D. M. LANG, Ph.D.

FACTORS OF SOIL DEVELOPMENT IN THE MALTESE ISLANDS

Soil is a commonplace which everyone recognises but few would attempt to define or even describe. Joffe (1949) defines soil as 'a natural body of mineral and organic constituents usually unconsolidated, differentiated into horizons, of variable depth, which differs from the material below in morphology, physical make-up, chemical properties and composition and biological characteristics'. This definition, like many others, does not satisfy everyone. It does not emphasise, for example, that the soil is continually changing because the plants which grow in it and the active myriads of the soil microfauna whose home it is, cause changes in its characteristics. However, to include this and many other concepts which it might be desirable to use would require a long time and a lot of paper, because soil is essentially very complex. 134

There are, according to Dokuchaeff, five factors involved in the development of soil, and of these probably three, parent material, climate and time, are fundamental in the production of the soils of Malta. Topography, the fourth factor, is largely dependent on the first three, since landscape is largely moulded by erosion and deposition related to the parent structure, process and time. Biological influences, the fifth factor, despite the activity of plants and animals, is presently dominated by man's work, the effects of which are secondary, producing modifications of the existing patterns, but nonetheless sometimes profound.

TIME

Maltese soils are all rather young or immature since pedological processes are slow in calcareous soils like these, particularly where acidic drainage water is very limited in quantity. Certain soils, for example, the red brown clays of the Terra group (p. 92) are believed to have formed largely under the influence of processes which have been superseded. Under a changed climate the new very slow processes have so far produced little change in the soil profile. It is a relic of the old process and thus the soils are, in a sense, relic soils, but at the same time very immature (young) soils under the new climate, because the new process has produced so little change.

In the San Biagio series, very young, man-made, carbonate raw soils (p. 87) dating only from when they were mined from the rock, are found in front of undermined terrace backwalls. Only a few yards away much older soils are developed from the same parent rock, and they are xerorendzinas (p. 90). While the raw soil has been subjected to natural processes for less than 50 years, the xerorendzina has been developing over several hundred years. Thus time is an important factor in the soil's development.

CLIMATE

The climate of Malta and Gozo, is a good example of the Mediterranean type. It consists of hot dry summers, having a high rate of evaporation and no rain, warm and showery autumns normally with a rainfall deficit, short cool winters with enough rainfall for agriculture in most years, but leaving insufficient reserve in the soil to combat the warm drying springs again having a rainfall deficit. The variation on sites of the same type is obviously small, but between deep-set valleys, north-facing scarp slopes and the main open plateaux or south-facing slopes there are often wellmarked differences in vegetation, both weeds and crops. The difference is striking because of the difference in insolation, and 132 134

[TEXT CONTINUES ON P.85]

thus of surface temperature regime. However, soil profiles show virtually no difference between different sites, and it is only in exceptionally wet locations that the normal pattern of aridity is sufficiently overcome to allow the development of noticeable humus horizons. 132 134

In the past there have been broad oscillations of climate responsible for the production at different times of widely differing soil materials such as the 'red soil' (red brown Terra clays), stoney calcareous debris and aeolian sands which are now the materials parent to the present soil. The present climate, however, is not a leaching climate.

This uniformly arid climate is in strong contrast with that of some other latitudes, for example, that of Britain, and suggests itself as the reason for the restricted range of soils found in Malta and Gozo.

PARENT MATERIAL

The rocks which are ancestors to the soils are all closely similar in type chemically, and only moderately variable in physical characteristics. Thus only a limited range of soil types is to be expected. However, the massive, well-jointed limestones have developed karst landscapes because they favour percolation and solution more than do the porous but nearly impervious finer-textured limestones. On the karstlands the red brown Terra clays have developed on almost completely de-calcified residues from the limestone, but on the other landscapes there has been a minimum of decalcification, and the soils are very like the rocks from which they have been formed. Thus, the composition of the impurities in the limestones from which they were originally weathered mainly decides the nature of the Terra soils (although inblown calcite has increased their calcium carbonate content). Similarly the texture and detailed composition of the carbonate raw soils and xerorendzinas is closely dependent on the parent material. The parent material type is therefore important for Maltese soils because it partly determines what pedological processes can take place and especially because the processes taking place now have little effect. 133 134

TOPOGRAPHY

Topography generally influences the development of the soil in a variety of ways, and chiefly through modifications of climate, variable conditions of drainage and effects on erosion and transportation processes. It has been noted that in Malta and Gozo the variations of topography produce sites with very different insolation conditions, but the effect on soil processes is negligible. It is only in the extremely freely-drained conditions of some hill tops, where lime crust yermas are simulated on parent materials of fine sandy loam texture that the effect of topography on drainage conditions can be thought to be sufficient to produce soil modifications. Flooding with sea water may be attributed to topography, and in the Alcol series at Salinas, for example, slight salinity is the result.

The effect of topography on erosion, transportation and deposition is more noticeable. Under former cooler climatic conditions, solifluct on took place, and under the present conditions sheet or gully erosion occurs during the violent showers of late autumn. The result is that there are strikingly different eroded and alluvial phases of the same soil series in some locations. On the Blue Clay soils the alluvial, light clay type is more favourable to agriculture than the eroded heavy clay type which is in patches alkaline or saline-alkaline.

BIOLOGICAL INFLUENCES

Apart from man's activities, biotic factors are of relatively small importance in the soils. Humus horizons are only developed under well grown and long undisturbed vegetation, which is very rare. The organic-matter deficient humus forms of the surface horizons of the cultivated soils can only be seen easily under the microscope, and the soil fauna seems to be very limited in numbers. 134 311

The modifications of the soil pattern produced by man are, on the other hand most profound. Apart from the large area of Malta which has been covered by human habitations, factories, airfields and military installations, where the

1: Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6

INTRODUCTION

Contemporary agriculture can only be understood in terms of the whole nexus of environmental and human factors. Although a general truism this assertion continually needs to be emphasised in a study of Malta. In these Islands the observer will meet more puzzling features both major and minor in scale than it is conceivable would be found in any territory of similar size. The wider one's comparative experience, the more it appears necessary to discard general principles and to adopt a habit of querying the origin of every minor element in the landscape. The various problems are examined elsewhere but a brief statement of their type and range will serve to depict the complex nature of Maltese agriculture.

All visitors to Malta are invariably impressed by the vast extent of stone terrace walls which give to the ground-level observer an impression of rocky barrenness. The questions which arise, and which have not been satisfactorily answered, are manifold in their complexity. Do the terrace-walls merely serve to retain naturally-evolved soil and if so is the present density of enclosures strictly necessary? Are these walls, on the other hand, ramparts behind which man-made soil accumulations have been slowly built up to create artificial fields? If the latter, does normal pedological analysis provide a sufficient basis for soil husbandry? If the former, how far can enclosures be enlarged to permit a greater use of mechanised techniques?

The climate of Malta, as analysed in Chapter II, has some especial characteristics. How far do certain combinations of temperature, humidity and wind velocity in various topographic circumstances encourage the appearance and survival of the very many diseases and pests which afflict Maltese crops? To what extent may the climate-soil complex be held responsible for the virtual absence of the olive and the remarkable ignorance concerning viticulture which is only now being dispelled? Must the physical environment be regarded as the main reason for the fact that Maltese farmers have never produced important indigenous strains of crops or livestock but have relied entirely on breeds imported from their more productive neighbours?

Innumerable queries of this type result from even the most cursory visual survey, and any attempt to answer them brings in even more complex human questions. If the maintenance of man-made soil in artificial fields by arduous manual labour is essential for the ecological stability of many regions, how important is the conflict between the needs of production and the social desires of the cultivators? How far has poor husbandry been a product of rural isolation? How measurable is distance as it affects contact between producer and market, between village-dweller and *il-Belt*? None of these and other questions is uniquely applicable to Malta, but *in toto* they present such a formidable array as to make one feel that these small islands have concentrated within them certain microcosmic qualities.

In this Section are considered some of the observable facts that directly concern the use and potentialities of agricultural resources. The main features of the economy and society in general have been described in previous sections; the basic elements of the agricultural sector may be summarised as follows.

The total area of the Maltese Islands is some 280,512 *tmien* of which 152,343 *tmien* are cultivated (54 per cent of the total) (1). The relationship between Malta and Gozo in these respects is remarkably constant, both islands having a similar proportion of worked land, Malta possessing 79 per cent. of the total area and of the cultivated land. Of the 7,272 *tmien* of irrigated land, almost 89 per cent. is found in Malta where the only large irrigated zones also occur.

This cultivated land is worked in 12,315 registered farmholdings of which over 70 per cent. are in Malta. The rural community (i.e. persons living in dwellings registered as farms and including farmworkers' children and other members of the family otherwise employed) number 57,354 (72 per cent. in Malta), almost 18 per cent. of the total population. Of this rural community 34

a reduction in the acreage planted during the following winter. In spring 1958, the export market could have absorbed more than the total production. Official encouragement to re-expand cultivation followed. Moreover, the main importing countries are those in which regulations governing the health of imported crops are most severe, and in which competition is most keen. When to these factors one must add two more, viz. the very high water demands of the crop and its comparatively low bulk value and high freight costs; then a very considerable doubt arises concerning the rationality of this sector of agriculture. On unirrigated land, a potato crop leaves the soil deprived of most of its water. On irrigated land it competes with crops of higher bulk value some of which are already cultivated on a smaller scale, such as strawberries, globe and Jerusalem artichokes, asparagus, sub-tropical fruits, etc. Potatoes require no less labour, no less fertiliser, and are much less amenable to handling by fast land or air transport. The impression left by the crop survey is that Malta has almost somnambulistically developed this specialisation and that the ecological and economic implications have never been seriously examined.

Figs. 79 and 80 show the extent of land under potatoes during March and April. In Malta, the main concentrations are to be found in three different types of region. First, cultivation is widespread on the Globigerina lands. Most intense around the 'casals' and villages of the east and south, it seems more to be associated with human rather than with physical factors (see Chapter VIII). A marked thinning out is noticeable on the higher central slopes rising westward to the Coralline uplands. Secondly, there exist the very important concentrations in the major irrigated basins of the west and north such as Wied tal-Pwales, the Mellieha isthmus and the Marfa oases. Lastly, potato cultivation is of considerable extent on the smaller and more dispersed irrigated plots of the Upper Coralline plateaux, e.g. Hofret ir-Rizz. In the predominantly dry-farmed upland basins of Bingemma and Mizieb, the acreage is relatively small.

Early potato cultivation in Gozo is of much less importance, the island being one further step removed from the export market. Concentration is significantly greatest within easy reach of the settlements. In addition, potato growing is of importance in the tree-fruit and vegetable zones of the north-east. The crop is almost entirely absent from the more remote areas.

TREE CROPS

In the Maltese Islands are to be found a great variety of tree-crops of all kinds on irrigated and non-irrigated land. This variety, exemplified in one field in the Wied Qlejgha which carries apples, peaches, loquats, pomegranates, citrus fruit and vines, is in some ways detrimental to cultivation standards. Only a very few regions are completely devoid of tree-crops. Thermal conditions make possible the growth of a crop range extending from the temperate pome fruits to sub-tropical and tropical types such as the date and banana (albeit with poor results in the latter cases). Low water availability in the soil is the main restrictive factor. Irrigation generally doubles the yields of fruit crops and is essential for citrus cultivation. It is, however, certain that yields could be considerably increased, even on unirrigated land, by improvement of stock quality, by reducing disease and pest infestation and by less intercultivation. One of the main problems in Malta and Gozo is that, as elsewhere in the world, farmers with a strong subsistence-farming streak in their makeup are apt to prefer the security of inter-cultivated poor crops to hazardous but rewarding specialisation.

One non-human factor which makes the arboriculturist's task more difficult is the wind-humidity complex. As noted in Chapter II, the effects of high wind velocity on transpiration and in producing physiological drought are considerable. High humidity, even in summer, produces special problems of plant pathology. Successful competition with more sophisticated producers possessing greater natural advantages seems unlikely.

1; Bowen-Jones et al. K-5 (1955-1958) 1961
EZ6 Malta EZ6
Malta

a but arbitrarily defined eastern limit is clearly distinguishable in the field by the large ramped rather than terraced fields of mixed good dry farming. 241* 311*

C. THE HILLS AND PLAINS OF THE CENTRE AND EAST

This area possesses a certain unity based on physical and human characteristics. As noted in Chapter I B, the landscape, although presenting a deceptively monotonous appearance to the eye, is in places emphatically dissected and the altitudinal range is fairly great (Fig. 1). The importance of minor relief features in this region is magnified by its relative uniformity; this in contrast to the scarplands of the west. 311*

There is also a less simple relationship between altitude, aspect and climate. Exposure to sea winds adversely affects many coastal districts. Away from the coast, land temperature conditions assume a greater importance in the development of local climates. Thus, even under insular conditions, regional contrasts between the interior and the periphery are marked (see Chapter II). [132]

In this eastern half of the island is found the core of Maltese life, both urban and rural, and links between town, village and country are everywhere close. There is no really widespread development of dispersed settlement. As noted in Chapter VI, Valletta (il-Belt) is the focus of a series of concentric zones of human activity. Around it lie, first, the residential and industrial towns of Sliema, Hamrun, Pawla and the Three Cities. Beyond these are large settlements in which urban and rural activities are intermingled but in which the former predominate. These include Birkirkara, Qormi, Tarxien and Żabbar. Clearly distinct, a third type of settlement, here termed *casal* or township, lies in an outer ring. This comprises Gharghur and Naxxar, Mosta, Żebbuġ, Siġġiewi, Qrendi and Żurrieq, Ghaxaq and Żejtun. Each of these forms an independent centre for rural life and each has developed some limited urban function. 311* 361

Inside this zone lie smaller settlements of varying character. Lija and Attard are increasingly attached to the growing 'suburban' development spreading westwards from the Valletta conurbation. Kirkop, Safi and Gudja are country villages, while Mqabba and Luqa have some non-rural additions. Along the eastern coast, with its fine natural harbours, are to be found the old fishing villages of Marsaskala and Marsaxlokk. At Birżebbuġa and Kalafrana, this traditional function has been submerged by more modern developments.

Communications are generally good and public transport services frequent, thus there are few areas of real remoteness. Throughout this part of the island, the attraction exerted by the Valletta conurbation affects all sectors of social and economic life. The larger casals have their own independent gravitational pulls. At either end of the rural-urban continuum, decline in rural life is taking place. The smallest villages such as Safi are losing population to their larger neighbours while on the fringe of the conurbation, part-time farming spreads over an ever-increasing area. 311* 369

Thus the character of cultivation in this part of Malta is the product of many interacting human and physical factors. These interactions combine in various ways to differentiate the five major and many minor regions considered below. 241* 311*

C.XVI. WIED QLEJGHA

From the Upper Coralline col at Ghajn Qajjet, Wied Qlejgha passes over a narrow outcrop of Blue Clay to become more open on the Globigerina beds, before entering the gorge of the Wied ta'l-Isperanza (101), cut in the Lower Coralline.

This is a transitional region between the West and Centre and suitably enough displays all the characteristic types of farming and crop assemblage. At Ghajn Qajjet, below Upper Coralline plateau *xaghra*, lies an intensively cultivated *ġuien* zone, mirrored on a smaller scale on the Blue Clay slopes below Mtarfa. On the terraced wied floor flanking the Chadwick lakes, good dry farming including viticulture is practised. The intermediate slopes of the basin are dry-farmed in

[Text Continues on p. 258-B]

132 The Maltese climate is characterised by variability rather than by extremes. Most of the complex elemental combinations, as far as we can tell at the moment, tend to inhibit soil and plant development under natural conditions.

The annual precipitation average of 20.5 inches is largely meaningless - the variations from one year to another for each month in which there has been recorded any significant rainfall are all several times the mean values. Very high insolation and evaporation rates, from the end of April to the beginning of October, further reduce the effectiveness of scanty and variable precipitation. Much of the rainfall of spring and autumn is associated with violent frontal storms and is sufficiently concentrated in incidence to produce ephemeral torrents and cause considerable erosion.

Wind incidence is of peculiar importance. The maritime air streams are generally of high humidity and velocity. The dominant Northerlies, in particular the stormy *Majjistral*, with high humidity and relatively low temperatures, have a biological effect bleak enough to produce a very clear ecological pattern controlled by aspect and shelter. The soil line in the lee of the ridges which lie transverse to these North to West winds, rises higher to the south east with the cumulative sheltering effect. On a small scale, windbreaks of stones, wattle hurdles and even cereal hedges, become of importance. The *Xlokk* comes as a warm humid wind of usually sufficient velocity to force plant transpiration rates above the critical points. The occasional humid still air conditions in winter delay germination and encourage fungus diseases while all summer winds heighten evaporation rates and cause actual soil blowing.

One of the few biologically favourable climatic features is the absence of a thermal dormant season. Mean monthly temperatures are consistently above 50° Fahrenheit, frosts are very rare, and diurnal ranges small. On the other hand, the associated high summer temperatures even though ameliorated by sea breezes produce considerable physiological troubles in plants and livestock. It is significant that over 80 per cent. of the flora now found in Malta are of North African rather than European type.

133 In the absence of human interference Malta must have been, as it still is in many areas, largely a barren karstic waste relieved only by a few basins and plains such as the Wied tal-Pwales and the Wied il-Ghasel. On the hill and ridge tops Terra Rossa formation takes place in solution hollows. On all slopes with gradients greater than 5 per cent., and on all but the most wind sheltered flatlands corrasion and movement, often exposing great stretches of bare rock, are dominant. Only in a few basins, such as the erosional Wied ta'Mazza or the tectonic Bur Marrad in the Wied il-Ghasel, does deposition become important.

In this harsh environment man created the land on which he could live.

134 311 Malta has few true soils but, rather, laboriously garnered and transported inorganic material, carefully built up with humic additions, terraced and walled into place and irrigated wherever possible. For millennia this making of *'campi artificiale'* has gone on and may still be observed, so that some two-thirds of what Bernard Shaw called 'a heap of stones' is now cultivable land. This process of the extension first of hydroponics and then of true farming over bare rock and the reclamation of unhealthy lowland has meant the creation of new and precarious balances. The artificially produced thin pseudo-soil is not self perpetuating. The underlying rock must be regularly chipped away, the solution hollows periodically harvested. The texture must be maintained by the addition of organic matter and by frequent working. The level of nutrients must be kept up with dung and fertilisers and the water content supplemented by irrigation. The terrace walls need constant repair.

In each case there is a sharply critical point beyond which action spells danger. The use of refuse brings bacterial and virus infections, frequent tillage produces a clean surface vulnerable to erosion, the use of irrigation water and artificial fertilisers raises soil salinity. Extension of the soil cover decreases the rate of percolation replenishment of the subterranean aquifers by rain water. Malta is now in fact living on capital as far as water is concerned.

241 There have been similar critical points in crop values. When water is available, the potential crop range is large - bananas grow in barley patches, date-

3: Buxton D-5 (1920-1921) 1922 EZ6 Malta EZ6

137 made of open stone pipes. On the rocks, in January, there was a wild profusion of
312 flowering heath, of a species akin to our heather (*Erica*). Where the water overflows, there are tiny reed beds, but always smaller and less luxuriant than those of the Eastern Mediterranean. In some places on these cliffs the charlock appears to have competed successfully with *Oxalis cernua*.

133 The north coast is generally more shelving. There are no mountains, but the whole surface is cut by deep ravines, which are for the most part dry, but which may contain as much as three feet of water during a spate; the mouths of some of these valleys form small fiords. The western part of the island, which contains the upper coralline beds, contrasts strongly with the eastern. The hills are higher, the valleys bigger and more rounded, and the country is less parched, owing to the underlying marls. The scenery of Gozo resembles that of Western Malta, but the cliffs are higher and grander, the fields are larger, and the country is greener.

241 Owing to the large population every foot of soil is precious, and the whole of
137 Malta is parcelled out into innumerable tiny fields, some hardly more than a few yards square, each being separated from the next by a stone wall. Olives and caribs grow as elsewhere in the Mediterranean, but for the most part they are limited to the courses of the streams; oranges flourish where there is sufficient water to irrigate them, but in Malta one looks in vain for the abundant orange groves of Sicily, or the pleasant tangled hillsides of Northern Cyprus. The myrtle is almost absent, the numbers of wild myrtle bushes can nearly be counted on the fingers of a man's hands. The flora (4) generally is most akin to that of Sicily; 94 per cent. of the Maltese species are found in that island, 91 per cent. in Africa, and 90·5 per cent. in the Levant (5). There are three things which are predominant in all the scenery of Malta: stone walls, goats, and the yellow flowers of the virulent *Oxalis cernua*, which not even the goats will eat.

132 Owing to the small size of Malta and the nature of its surface, the weather is dominated by two factors—the sea and the direction of the wind. The mean annual temperature is 66·6° F., the mean annual rainfall is 21·6 inches, precipitation normally occurring on 81 days. The mean relative humidity for seven years is 79·1 per cent. The coldest month is February (mean temperature 52·9° F.); the hottest August (77·9° F.). During June and July practically no rain falls, and in August the mean is only 0·13 mm. (6).

361 In working out constants, I have divided the islands into two areas—Urban and Rural. This is the division in the census (31), and corresponds very closely to a marked difference in the conditions under which the population lives. The former includes the fortified towns and suburbs, Valletta, Floriana, Cottoneria, Senglea, Conspicua, Sliema, St. Julian, Pieta Misida, Hamrum, Birchircara, Curmi, Paula, Tarxien, Zabbar, Calcara and Rabato; the latter, the more isolated villages in the country.

3: Buxton D-5 (1920-1921) 1922 EZ6 Malta EZ6

141 height in the urban districts and Zurrico. Among the females there is a significant difference between Malta and Gozo in greatest breadth, bigonial breadth and nasal height. There is no significant difference between the urban and rural districts. Between male and female, the males have a significantly greater bizygomatic breadth, the females significantly greater external orbital breadth, nasal height and cephalic index.

It is impossible to compare the absolute measurements of males and females. There is no significant difference in the total facial index between males and females, the other three indices are, however, significantly different, the females having the greater index in every case.

These differences are extremely difficult to correlate with actual facts. That the urban and rural population should resemble each other so closely is a striking feature, especially since we know that Valletta is, and has been, continually receiving additions, both from the outside world and from other parts of the island. In spite of this immigration, however, we do not appear to get an appreciably larger variation in the town than in the endogamous villages, if we take them *as a whole*. Contrasts arise, however, between the urban districts and individual villages. It may be suggested tentatively that the small local variations which appear to occur in the various villages tend to be swamped if we take all the villages together, as we can do artificially by pooling our measurements, and actually by measuring individuals from Valletta and the fortified suburbs, which have only existed for under four hundred years, that is to say about eleven generations, and have a population recruited from all over the island. This fact is all the more remarkable because, as we have shown, foreign blood has certainly been pouring into Valletta for a considerable period.

It may be argued that possibly the isolation in the island is not sufficiently complete, yet there is as much difference between the urban districts and the village of Zurrico as there is between Malta and Gozo, although in different directions. The isolation of the villages, a social more than a geographical division, has proved as strong or as weak a frontier as the hazardous strip of water between the two islands.

The measurements on females throw little light on this point. There is a greater difference between the urban and rural district women than between those of Malta and Gozo; the latter series are unfortunately too few for more than a tentative inference. Social conditions cannot contribute much in the result, because whereas the women are comparatively stationary, apart from country and town marriages, there is considerable movement of the males.

141 Let us now consider the differences in the facial measurements. Professor
● 132 Arthur Thomson (39) has suggested that the temperature and the humidity of the air have considerable effect on the form of the nose. The rainfall, at different stations at which observations are taken, differs to quite a large extent. For example, in

3: Buxton D-5 (1920-1921) 1922 EZ6 Malta EZ6

1919, 14·18 inches were recorded at Casal Lia, and 19·44 at Naxaro. Unfortunately no comparative humidity data are available, but such a striking difference in rainfall argues that the inhabitants of those two places breathe an atmosphere which differs at least appreciably in moisture. Again, local variations in temperature, if not great, may prove significant. At the same two stations the annual means of temperature for that year were, maximum 71·5, minimum 56·8, mean 64·1 at Casal Lia, and 69·9, 53·7 and 61·8 respectively at Naxaro, a big difference if the total area of the archipelago is taken into consideration.

The differences in the upper facial height may be, and probably are, associated partly with the respiratory (including as it does the nasal height) and partly with the masticatory apparatus, and the same is true of the total facial height, which includes both the two last-mentioned factors. It is interesting to note that differences in the total facial height are always associated with differences in the bizygomatic breadth; differences in the upper facial, with differences in the nasal height. The converse, though true in the former case, is not true in the latter. The differences in the bigonial breadth accompany differences in the minimum frontal diameter on the two occasions where they occur, but the excessive minimum frontal diameter at Zurrico is not associated with any irregularity of the bigonial breadth. The differences in the external orbital breadth do not appear to have any particular associations.

Although no doubt it is possible that these local differences may be largely due to heredity as opposed to environment, it would seem not unlikely that the present rather insignificant differences, taken as a whole, may be ascribed to small variations in climatic and economic conditions, to most of which the people have been subjected for many generations.

The differences between the sexes in head form is difficult to estimate. Obviously we cannot compare the absolute measurements, because the female is built on a different scale from the male, and to reduce them to similar proportions would be to abandon certain fundamental anatomical principles. There remain, however, a comparison of the variations and the indices. The former do not present great differences. The nasal height and the external orbital breadth of the female are appreciably more variable. The bizygomatic breadth of the male has a significantly wider dispersion. It is possible that in the latter case the greater muscular development of the male may account for this variation. The exact significance of the striking differences between the indices is not apparent.

Pigmentation.

Pigmentation figures bring out a certain contrast already suggested by measurements, and fail to confirm others. The figures are, however, rather unsatisfactory, and it was not found practicable to make more than three divisions in hair or eye

3: Buxton D-5 (1920-1921) 1922 EZ6 Malta EZ6

The stay of the French in the island was too short to have any effect on the population. A social barrier has been built up between the British and the people of the land, and the general impression gained is that, though there are a certain number of mixed marriages, there cannot, even after three generations of a large, if floating, British element in Valletta, be more than a very thin British strain in the population.

We have shown, in dealing with the history of the island, how extremely difficult it is to account for the wholesale immigration of an Armenoid-like population at any period. We have also shown how, in spite of the continual immigration of people of the Mediterranean stock, the Maltese type (*i.e.* Malta second race, displaying Armenoid characters) appears to have persisted for a long period. It would seem, therefore, a point worthy of further consideration, whether the development of the Maltese along the lines they appear to have followed may not be due to certain definite geographical factors of whose influence we are as yet unaware. It is possible that if we had at our disposal a long unbroken series, instead of larger or smaller series from Neolithic, Mediæval, and modern ossuaries, we should not find such striking contrasts as we do at present. Anthropological data from various parts of the Mediterranean show that there is very often a significant difference between two villages in different valleys of the same mountain range. It is possible that even the few generations which have elapsed between the building of Hal Tarxien and 1921 may be the equivalent, in time, of such a journey in space, and certain big changes may have taken place owing to changing geographical conditions. There can be little doubt that the climate of Malta has changed very much, not only since the first terrace was cut in the Weid Dalam, but even since the formation of the second terrace. We have also suggested that the evidence from Professor Zammit's excavations at Hal Tarxien hints at a change in climate since Neolithic times. The change in the structure of the population may be due, therefore, partly to geographical as well as to historical causes.

Whether or no the development of the Maltese sub-race is due to particular geographical conditions, there can be little doubt that, in Malta at least, the strain is biologically remarkably successful and extremely fertile. In spite of the high infant mortality which has existed in the past, they have continued to increase, and the modern developments of hygiene and the care of infants are likely to make the increase still more rapid. If the overcrowding continues, in a comparatively short time we shall be faced with conditions in the island which would appear to be, biologically speaking, unsatisfactory. Sanitary conditions can be improved, food can be imported, but excessive overcrowding may bring its own remedy, either in disease or in a diminished fertility. The present fertility is quite possibly due to some underlying climatic condition. In spite of lack of water, Malta has long been extremely fertile botanically, and was famed for this in classical times. The Maltese goats, by far the most abundant large mammal of the island apart from

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

after the next meeting of Parliament; and to declare the isle of Malta to be part of Europe"—

> that the said Island of Malta and dependencies thereof shall be deemed, taken and construed to be part of Europe for all purposes, and as to all matters and things whatever; any law or laws, usage or custom, or act or acts, to the contrary thereof notwithstanding.

But this enactment, although it satisfied the administrators, did not wholly silence the men of science, who produced, in addition to Europe and Africa, yet a third continental claimant to the geographical ownership of the Maltese Islands. In the middle of the nineteenth century a Maltese architect and engineer named Grognet de Vassé, best known as the designer of the great Parish Church of Mosta, propounded the theory that the submerged continent of Atlantis lay between Cyrenaica in the east and Tunis in the west, almost filling the indentations in the coast of North Africa which the Romans called Syrtes Major and Syrtes Minor and we know to-day as the Gulfs of Sidra and Gabes. Of this continent, said Grognet, the Maltese archipelago formed the north-western corner; and he published a learned treatise in support of his theory, which he based on ample references to mythology, etymology and classical geography.

It is an ingenious piece of imaginative reasoning whereby the author places the Elysian Fields and the lower world of the ancients in Atlantis, the mouths of the rivers Acheron and Phlegethon in that part of Atlantis which is Malta—namely, in the Grand Harbour and the harbour of Marsa Mxett—and an outlet of the river Styx in one of the springs of the gardens of the Villa Frere, for many years the beautiful residence and garden in Pietà of the distinguished scholar, man of letters, diplomatist and friend of Sir Walter Scott, the Right Honourable John Hookham Frere.

Nevertheless the legislators of 1801 were rightly inspired, for in climate and vegetation no less than in the works of

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

man Malta is essentially European, a projection of Europe into the south. Its vegetation is of the Mediterranean type, similar to that of Southern Spain, the Riviera, Sicily and the islands of the Ægean although, strangely enough, it lacks among its wild flowers the cyclamen which so delightfully and characteristically, in springtime, carpets the ground in Cyprus and the Isles of Greece. Here and there, it is true, there rises above its pines and cypresses and carob-trees an occasional stately date-palm, suggesting a garden-escape from the groves of Tunis. And Tunis, whence come the best dates in the world, lies, be it noted, to the north of Malta. But the fruit on the date-palms of Malta practically never ripens. Malta is too European for that.

2

If anything shaped as differently from a circle as the Mediterranean can be said to have a centre, that centre is Malta. The Maltese archipelago is equidistant from the Mediterranean's western and eastern extremities; it is its half-way house between Occident and Orient, historically no less than geographically; it has been its nerve-centre—and more than its nerve-centre, its magnet—from the "time whereof the memory of man runneth not to the contrary." All the people of the Middle Sea have possessed, influenced or coveted Malta at one time or another, the first to do so of whom we have definite knowledge being a small seafaring, trading and colonizing tribe from its easternmost shores. "The twin islands of Melita and Gaulos," wrote Professor Freeman, "lay immediately in the way of Phœnician adventurers" and became, and remained for centuries, a Phœnician settlement. It was the all-absorbing power of Rome that first brought them into the European fold.

As the nerve-centre, as the magnet, of the Mediterranean Malta was all but snatched back from the European fold when the Ottoman Sultan Suleiman the Magnificent sought

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

desperately to drive out the Knights of S. John as over forty years previously he had driven them out of Rhodes. But he was now concerned with a wider issue than that of blunting once more that spearhead of the Church militant: he had grasped the point that Malta as his advanced naval base would make him the master of the entire Mediterranean. Even more fully, and for a short time successfully, was the point grasped by Bonaparte, who saw in Malta not only the naval base indispensable to the command of the Mediterranean but a vital link in the route to a farther East than Phœnician or Roman had known. Thereafter neither William II nor the Axis dictators had anything fresh to learn on the subject. Malta's strategic rôle had become a postulate.

3

At the beginning of 1959 the Maltese archipelago had an estimated population, formidable for its size, of 323,629 souls (exclusive of the personnel of the armed Services), to which Gozo contributed 27,846 and little Comino 30. That is to say that it contains close on 2700 people to the square mile, which makes it one of the most densely populated geographical units in the world. The figure would have been higher but for considerable post-war emigration to Australia and elsewhere. But if, even so, it is high when measured by the area of 121 square miles[1] on which it has to live, it is small for a separate nation. For the Maltese are a nation unto themselves, with their own language, their own traditions, their own physical characteristics and a history that is one of the longest to which any existing people can lay claim.

For some reason hitherto unexplained it was in Malta and Gozo that the art of building in remote Stone Age days reached a development of skill and refinement unknown in other centres of the megalithic and neolithic worlds. Malta was already, therefore, an ancient centre of civilization when

[1] *I.e.*, about five-sixths of the area of the Isle of Wight.

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

the "tempestuous wind called Euroclydon" that still whistles across it during the winter months under its modern name of *gregale*, the "Greek wind," drove S. Paul on to its shores and brought it about that the "chief man" of the island, Publius, became its first Bishop. It was a centre of civilization, as well as a centre of the religious life of the Western Mediterranean, very much earlier, for Malta, in the words of the lamented Sir Themistocles Zammit, "was the holy island of neolithic faith, the half-way house of the early mariners, who trusted themselves to their frail wooden craft, full of hope in a protecting power."

Later, when we emerge from prehistory, we find the position reversed: Malta, instead of extending supernatural protection to peoples beyond its shores, comes under the political protection of others. During the many centuries of its recorded history Malta has had many rulers: the Phœnicians and their offspring, the Carthaginians, then Romans, Arabs, Normans, Angevins, Aragonese and Castilians, then for two and a half centuries the international Order of S. John of Jerusalem, and, finally, at the invitation of the Maltese people after a brief French occupation, the British. But despite the impact of such cosmopolitan influences this people has clung tenaciously to its ancient tongue, which is unquestionably of Semitic structure and has claims to descent from the speech of Dido and Hannibal.[1] It was, in fact, from a bilingual inscription in Phœnician and Greek found in Malta in 1697, of which more will be said in the following chapter, that the Phœnician alphabet was reconstructed. Of this inscription Dr A. V. Laferla writes in his *Story of Man in Malta*: "The construction and grammar . . . are identical with those of modern Maltese and many of the words (*lil, bin, tnejn, jisma, iberikom*) are still in use at the present day." S. Luke in the Acts describes the Maltese as "barbarians"—that is, as neither Greeks nor Romans—and

[1] The name Hannibal is still met with in Malta as a Christian name. Its Maltese diminutive is Nibbio.

9: Luke G-5 (ca. 1920-ca. 1960) 1960
EZ6 Malta EZ6

(and where do they not exist?), his book gave a certain amount of offence in the more sensitive quarters of the island. None the less, it includes a chapter which should have atoned for any "causes of stumbling" created in those quarters. The chapter is entitled "Dolores" and concerns the Shepherds' Maltese maid-of-all-work and their baby's nurse. "Dolores" is not only a telling tribute to some of the salient virtues of the Maltese character; it is one of the most sensitive and moving descriptions of the personal devotion of a servant to her employers and her charge that I have had the good fortune to read.

4

A word has been said earlier in this chapter as to the grandeur of the cliff scenery of Malta. Inland, on the other hand, the countryside can scarcely be called either grand or impressive, and during the dry summer months there is little colour to set against the brown aridity of the fields other than the sage of the olive, the carob and the fig-trees, and the pinks and whites of the oleanders beside the roads. But after the autumn rains have begun to refresh the parched earth the land rapidly assumes a mantle of young green, and the wild flowers appear shyly above ground, beginning with two lovely miniature blooms—the brilliantly blue *Iris minuta* and the even more ethereal, strongly scented "*satarina*" (*N. serotinus*). This, the tiniest of the narcissi, looks as if it had been called into being by a touch of the fairy's wand in Walt Disney's *Fantasia*.

Later, in March and April, Malta and Gozo alike seem to glow with the crimson, deepening into purple, of the *sulla*, the clover or sainfoin with which thousands of acres are sown for fodder. Among the most striking blends of colour are those produced by many varieties of Bougainvillæa (which flourishes exceedingly in Malta) and the purple-and-cream flowers of the wild caper, against the background of the rich gold of the fortifications.